 0030-0950/81/0002-0083 $2.00/0

ANALYSIS OF WATERFOWL HARVEST IN MERCER COUNTY, PA.[1]

FRED J. BRENNER, THOMAS J. MORRIS[2] and ROBERT BLAUSER,[3] Department of Biology, Grove City College, Grove City PA 16127

Abstract. Age, sex and species composition of waterfowl harvested on a new marsh development were determined from wing collections. Mallards (*Anas platyrhynchos*) and wood ducks (*Aix sponsa*) were harvested in greater numbers than other species, the number harvested being directly proportional to the number of birds observed on the marsh during pre-season surveys. The number of mallards harvested was also directly related to the number of game farm birds released prior to the opening of the season.

OHIO J. SCI. 81(2): 83, 1981

In order for wildlife biologists to evaluate the productivity of an area as wildlife habitat, information on the age, sex, species composition and estimated size of the harvest must be obtained by field personnel. An analysis of the age, sex and species composition of waterfowl may be determined from wing collections obtained from hunters (Anderson and Timkin 1971, Boyd *et al* 1975, Carney 1964, Carney and Geis 1960, Krapu *et al* 1979, and Taber 1971). The information obtained from these wing collections may be representative of the total population (Bellrose 1944 and Bellrose and Chase 1950) and, therefore, it may be indicative of the area (Leopold 1933). In order to evaluate a newly created waterfowl habitat created by the impoundment of Sandy Creek under the auspices of P.L. 566, we initiated a study on the age, sex and species composition of waterfowl as well as size of harvest and hunter success. We conducted our study over a 5-year period from 1972 through 1976.

Study Area

Our study was conducted on State Game Lands #270 located near Sandy Lake in Mercer County, Pennsylvania. A marsh (length 6.5 km; width 0.3–0.5 km) was created on the upper portion of a 16 km flood control reservoir by the United States Soil Conservation Service. The dam was completed in the spring of 1969 and was opened to the public the following summer. The timber was not removed prior to flooding, and the common species consisted of oaks (*Quercus alba, Q. rubra, Q. palustris*), hickories (*Carya ovata, C. tomentosa*), maples (*Acer rubrum, A. saccharum*), American beech (*Fagus grandifolia*) and hemlock (*Tsuga canadensis*). Other important woody species include black willows (*Salix nigra*) and alder (*Alnus serrulata*). The herbaceous vegetation included the usual species of cattail (*Typha latifolia*), duckweed (*Lemma* sp.), arrowhead (*Sagittaria latifolia, S. cuneata*), sedges (*Carex* sp.) and water milfoil (*Myriophyllum* spp.).

METHODS

We determined pre- and post-season population estimates from direct counts of waterfowl at access points situated around the marsh. The numbers of species observed were recorded and calculated as waterfowl days. For example, one mallard observed was calculated as a one mallard day and 2 mallards as 2 mallard days, *etc.* In addition, we conducted a pre- and post-season survey by transecting a prescribed course of 4.8 km (3 miles) by canoe. These surveys were conducted within 3 days of the opening of the waterfowl season, and the final survey was conducted after the first week of the season.

Wings were collected from hunters by the authors and field representatives of the Penn-

[1]Manuscript received 23 October 1979 and in revised form 5 February 1980 (#79-54).

[2]Present address: College of Law, University of Akron, Akron OH.

[3]Present address: School of Medicine, Temple University, Philadelphia PA.

sylvania Game Commission. The age, sex and species identification was determined according to the techniques described by Carney and Geis (1960) and Taber (1971). These age and sex criteria were based on the characteristics of the tertial feathers and speculum as reported by Kortright (1943). We conducted all statistical analyses of correlation according to the procedures described by Simpson *et al* (1960) and Snedecor (1956).

RESULTS AND DISCUSSION

Waterfowl population estimates conducted prior to and during the waterfowl

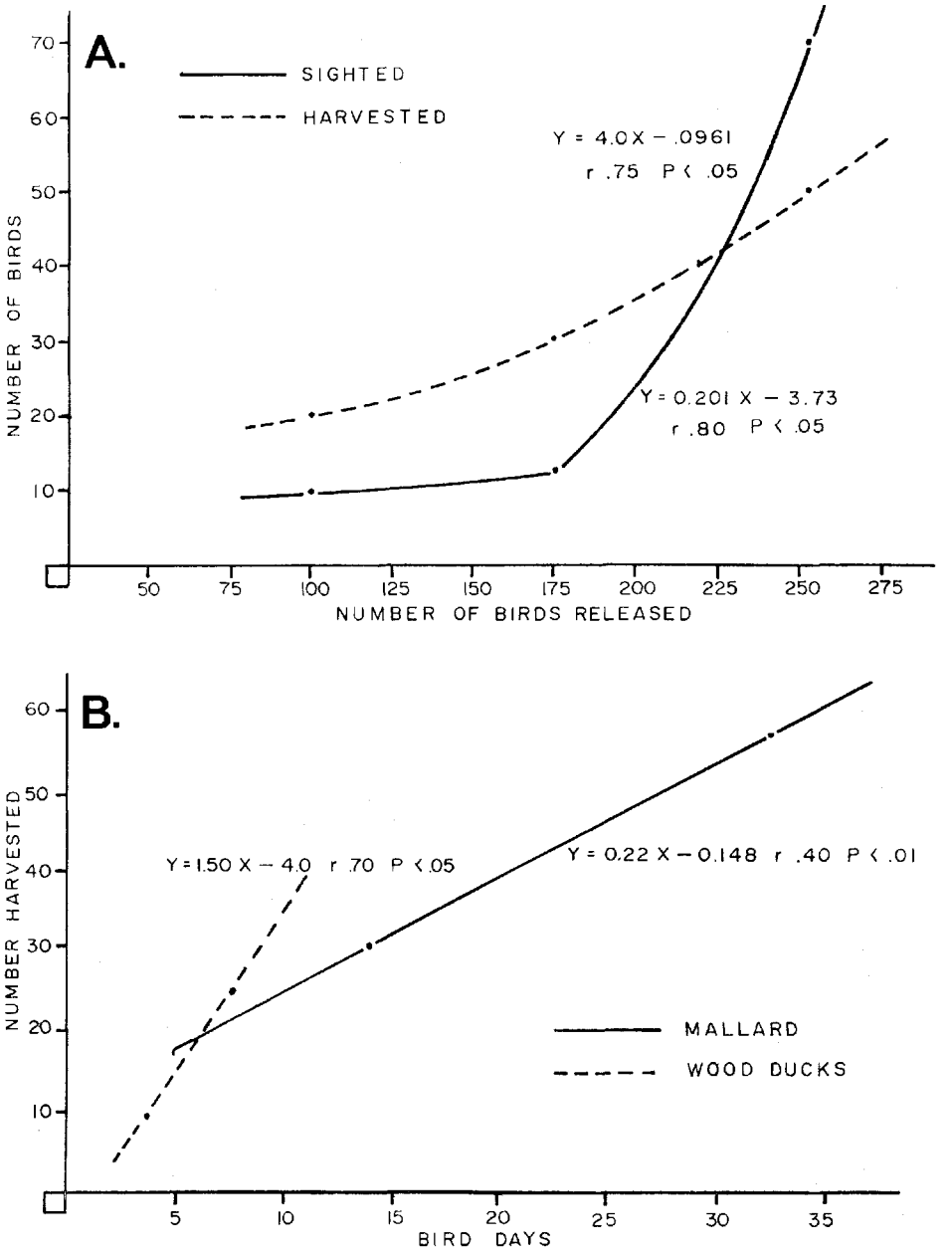

FIGURE 1. A: Correlation between the number of game farm mallards and the number of birds sighted and harvested on State Game Land #270. B: Correlation between the number of mallards and wood ducks sighted and harvested on State Game Land #270.

season 1974–1975–1976 and reports of Game Commission personnel indicated that the majority of the harvest occurred during the first 2 or 3 days of the season, and the number of hunters and birds observed after the first week of the season was relatively low. Parr and Scott (1978) indicated that roosting flight counts were not a good indicator of population size for wood ducks, but our observations of the number of mallards and wood ducks observed during pre-season may be a good predictor of the potential harvest for these species. A regression and correlation analysis indicated a significant correlation ($P < 0.05$) between the number of duck days for these species and the harvest based on wings collected from hunters (fig. 1).

The American coot (*Fulica americana*), mallard and wood duck were the principle species harvested by hunters from 1972 through 1976 (table 1). In 1972, the black duck (*Anas rubripes*) was an important species; 30% of the wings examined were from this species compared with 18% and 35% for the mallard and wood duck, respectively. Black ducks, however, were not harvested in any significant numbers after 1972. In subsequent years, mallards increased in importance in their contribution to the total harvest (table 1). The number of wood ducks decreased in 1973 but the number of birds harvested remained stable from 1974 through 1976. The proportion of blue-winged teal (*Anas discors*) in the harvest did not vary from year-to-year, and their contribution to the harvest was relatively small each year. Green-winged teal (*Anas carolinensis*) did not appear in wing collections until 1974 and in subsequent years they did not appear in sufficient numbers to make a significant contribution to the total harvest (table 1). The importance of mallards in the harvest was further

TABLE 1

Age, sex and species composition of waterfowl harvested on State Game Lands over a 5-year period.

Species	Year	Male			Female		
		Juvenile	Adult	% Total	Juvenile	Adult	% Total
Mallard	1972	6	3	41	10	3	59
	1973	7	3	48	5	6	52
	1974	12	20	59	12	10	41
	1975	15	8	72	5	4	28
	1976	10	2	57	6	3	43
Wood Duck	1972	5	26	72	6	6	28
	1973	1	5	83	1	1	25
	1974	4	8	44	9	6	56
	1975	4	0	40	2	4	60
	1976	2	3	56	2	2	45
Blue-winged Teal	1972	1	5	43	4	4	57
	1973	0	5	83	0	1	17
	1974	0	2	50	1	1	50
	1975	2	0	67	1	0	33
	1976	0	0	0	0	0	0
Green-winged Teal	1972	0	0	0	0	0	0
	1973	0	0	0	0	0	0
	1974	1	2	60	0	2	40
	1975	0	1	100	0	0	0
	1976	0	1	25	0	2	50
Coot	1972	0	0	0	0	0	0
	1973	0	0	0	0	0	0
	1974	18	23	66	15	6	34
	1975	2	5	70	0	3	30
	1976	1	0	50	1	0	50
	Total	91	122		80	64	

substantiated by an analysis of the number of birds harvested per hunter from 1974–1976. The number of mallards per hunter was 0.21 in 1974 and 0.42 in both 1975 and 1976, while the number of wood ducks and blue-winged teal did not vary during these years (table 2). The size of the harvest is, therefore, dependent on the number of mallards and hunters present on the area during the season. Another factor, however, may be the greater vulnerability of mallards to gunning pressure when compared to other species.

gunning pressure. Of the 100 birds released on the study area, only 3 bands were recovered (3%). Preliminary analysis of all birds released in the state indicated that approximately 5% of the bands returned the first year and >1% the second year after release (Fred Hartman, Waterfowl Biologist, Pennsylvania Game Commission). Thus, based on band returns, game farm birds do not contribute significantly to the harvest but they may act as a live decoy to attract wild birds. These estimates of band returns may be

TABLE 2

The number of waterfowl harvested per hunter on Pennsylvania State Game Lands 270 over a 3-year period (1974–1976).

Year	No. Hunters	Mallard	Wood Duck	Blue-winged Teal	Other	Total
1974	250	0.21	0.10	0.03	0.28	0.62
1975	75	0.42	0.13	0.05	0.15	0.76
1976	50	0.42	0.18	0.08	0.06	0.74

The large number of American coots harvested in 1974 was due to a large concentration of the birds on the study area, which did not occur in the other years. If these birds were eliminated, mallards became even more important in their contribution to the harvest. The number of mallards harvested may not represent an adequate evaluation of the natural population since between 100 and 300 game farm birds were released on the study area from 1973 through 1976, and the number of mallards observed and harvested increased in geometric proportion to the number of birds released on the area as determined by a least square analysis (fig. 1). Numerous studies indicate that released birds tend to gather in large groups, thereby increasing their vulnerability to hunters (Wells 1952, Hunt *et al* 1958, and Jahn and Hunt 1964). These released birds may also act as a decoy for attracting migrating waterfowl. All game farm mallards released during 1976–1978 in Pennsylvania were banded to provide information as to their survival, movement and vulnerability to deflated, however, due to the failure of hunters to report banded birds.

Mallards and wood ducks were the only species harvested in sufficient numbers for determination of sex and age ratios. Juvenile mallards were harvested in larger numbers than adults in every year except 1974, when the ratio of adult to juvenile birds was approximately equal (table 1). The number of juvenile mallards, at least in part, possibly represents the game farm birds stocked on the area, since a high proportion of these birds would be juveniles. Juvenile mallards have been found to have an overall mortality rate 1.5 greater than adults and juvenile birds were more vulnerable to gunning pressure than adults (Bellrose and Chase 1950, Bellrose 1944).

The proportion of males harvested differed between wood ducks and mallards. The proportion of male mallard wings collected from 1972 through 1975 continued to increase, although there was a slight decrease in 1976. Male wood ducks represented over 70% of the harvest in 1972 and 1973, decreasing

to approximately 40% in 1974 and 1975, although there was an increase in 1976 (table 1). The reason for the large number of adult male wood ducks present in the harvest in the first years of the study is not known, but could be due to a number of factors including hunter selectivity for males.

Acknowledgment. We express our thanks to Mr. Barry Ray, District Game Protector, Pennsylvania Game Commission, for his aid in obtaining wings from hunters. This study was supported by a Grant-in-Aid from The National Wildlife Federation.

LITERATURE CITED

Anderson, B. W. and R. L. Timkin 1971 Age and sex characteristics of common mergansers. J. Wildl. Manage. 35: 388–393.

Bellrose, F. C. 1944 Duck populations and kill: an evaluation of some waterfowl regulations in Illinois. Bull. Ill. Natur. Hist. Surv. 23: 327–372.

——— and E. B. Chase 1950 Population losses in the mallard, black duck, and bluewing teal. Ill. Natur. Hist. Surv. Biol. Notes. 22: 27 pp.

Boyd, H., J. Harrison and A. Allison 1975 Duck wings: a study of duck production. AWAGBI Publication. Marley Ltd. and Harrison Zool. Mus. Chester, Great Britain. 112 pp.

Carney, S. M. 1964 Preliminary keys to waterfowl age and sex identification for means of wing plumage. U.S. Fish Wildl. Serv. Spec. Sci. Rep. No. 82, 47 pp.

——— and A. D. Geis 1960 Mallard ages and sex determination from wings J. Wildl. Manage. 24: 372–381.

Hunt, R. A., L. R. John, R. C. Hopkins, and C. G. Ameling 1958 An evaluation of artificial propagation in Wisconsin. Wisc. Conserv. Dept. Tech. Wildl. Bull. 16, 79 pp.

Jahn, L. R. and R. A. Hunt 1964 Duck and coot ecology and management in Wisconsin. Wisc. Conserv. Dept. Tech. Bull. No. 33, 212 pp.

Kortright, F. H. 1943 The ducks, geese and swans of North America. Wildl. Manage. Inst., Washington, D.C. and Stackpole Co., Harrisburg, PA 476 pp.

Krapu, G. L., D. H. Johnson and C. W. Dane 1979 Age determination of mallards. J. Wildl. Manage. 43: 384–393.

Leopold, A. 1933 Game management. Charles Scribners and Sons. New York, 481 pp.

Parr, D. E. and M. D. Scott 1978 Analysis of roosting counts as an index of wood duck population size. Wilson Bull. 90: 335–478.

Simpson, G. G., A. Roe and R. C. Lewontin 1960 Quantitative zoology. Harcourt, Brace Co., New York, 440 pp.

Snedecor, G. W. 1956 Statistical methods. Iowa St. Coll. Press. Ames, 534 pp.

Taber, R. D. 1971 Criteria for sex and age, pp. 325–401. *In:* R. H. Giles (ed.) Wildl. Manage. Tech. 3rd ed. The Wildl. Soc. Washington, D.C.

Wells, R. A. 1952 Dividends in ducks. Part II: The program for small marshes. New York St. Conserv. 6: 25–26.